Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

STATION PAPER NO. 12 AUGUST 1953

# ESTIMATING UTILIZATION OF IDAHO FESCUE (*FESTUCA IDAHOENSIS*) ON CATTLE RANGE BY PERCENT OF PLANTS GRAZED

LIBRARY
[illegible] - 53

By

Richard M. Hurd and Neland A. Kissinger, Jr.

ROCKY MOUNTAIN FOREST AND RANGE EXPERIMENT STATION*
FOREST SERVICE
UNITED STATES DEPARTMENT OF AGRICULTURE
FORT COLLINS, COLORADO

*Maintained in cooperation with Colorado A & M College

STATION PAPER NO. 12 August 1953

# ESTIMATING UTILIZATION OF IDAHO FESCUE (FESTUCA IDAHOENSIS) ON CATTLE RANGE BY PERCENT OF PLANTS GRAZED

by

Richard M. Hurd and Neland A. Kissinger, Jr.[1]

A number of methods to determine the utilization of range forage plants have been used with varying degrees of success and satisfaction to the user. A method, to be useful in judging utilization on large units of range such as grazing allotments on national forests, should be rapid, easy to use, understood by the user, and give reliable results. Ordinarily, extreme accuracy is not a prerequisite for a utilization survey on large range units or allotments. Instead, a well-distributed sample which will yield reasonably reliable results is preferred. The method presented here appears to meet these requirements for estimating utilization of Idaho fescue (*Festuca idahoensis*) on cattle ranges.

The data used to develop the method were obtained on the Bighorn National Forest in north central Wyoming. On this Forest, Idaho fescue is an important component of the herbaceous vegetation on cattle ranges. This grass accounted for approximately 13 percent of the vegetative cover, 33 percent of the cover provided by the grass and grasslike vegetation, and 49 percent of the grass and grasslike herbage production on sampled ranges (1).[2] Furthermore, this fescue ranks high in preference and on the sampled ranges supplied from 50 to 75 percent of the forage. The importance of Idaho fescue on these ranges suggested that its utilization may, in a large measure, be used to judge the utilization of the range as a whole.

---

[1] Range Conservationists, Rocky Mountain Forest and Range Experiment Station. Big Horn Research Center Headquarters at Laramie, Wyoming, in cooperation with the University of Wyoming. N. A. Kissinger is now stationed at Fremont National Forest, Region 6.

[2] Underlined figures in parentheses refer to References Cited.

## Derivation of the method

Information on species preference and utilization of grass and grasslike plants on the Bighorn National Forest cattle ranges has been obtained by the ocular-estimate-by-plot method described by Pechanec and Pickford (2). This method expresses utilization as the estimated percent of the herbage weight removed by grazing animals. During 1951 and 1952 the utilization estimates were recorded by species for each plot to show (1) an estimate of the number of plants grazed expressed in percent, and (2) an estimate of the percent of the weight removed from the grazed plants. The products then represented the utilization of the species for the plot. The sampling unit consisted of a 500-foot transect with ten 25-square-foot circular plots at regular intervals.

At the close of the 1951 season a preliminary analysis was made to learn if number of plants grazed expressed in percent and the percent utilization of Idaho fescue were associated. The results of the analysis were promising and suggested additional investigation. Roach (3), using a stubble-height method for determining utilization, had found there was a consistent relationship between percent of ungrazed perennial grass plants and utilization of perennial grasses on semidesert ranges in Arizona.

The 1952 Idaho fescue utilization data were analyzed following Snedecor's (4) discussion of regression. The final outcome of this analysis was the construction of the curve in figure 1, based on 42 transects which contained utilization estimates ranging from 1 to 80 percent. This curve was derived from the equation $\log Y = 0.5668 + 0.01421 X$ wherein the logarithms of Y (percent utilization) and the natural numbers of X (percent of plants grazed) were used. The correlation coefficient was highly significant, having a value of 0.916.

The regression equation was tested with 1951 data, none of which had been used in the analysis. These data consisted of 30 transects having utilization estimates ranging from 1 to 73 percent. The mean utilization of Idaho fescue on these transects as determined by the ocular-estimate-by-plot method was 27.6 percent; the mean utilization based on percent of plants grazed (Fig. 1) was 27.4 percent. Although data from only 1 year are available for comparison, they do substantiate the value of the curve for estimating utilization.

## Recommendations for use

The percent of plants grazed should be determined by using a straight line pace transect on level or gently rolling topography. On sloping ground the transect should follow the contour. An

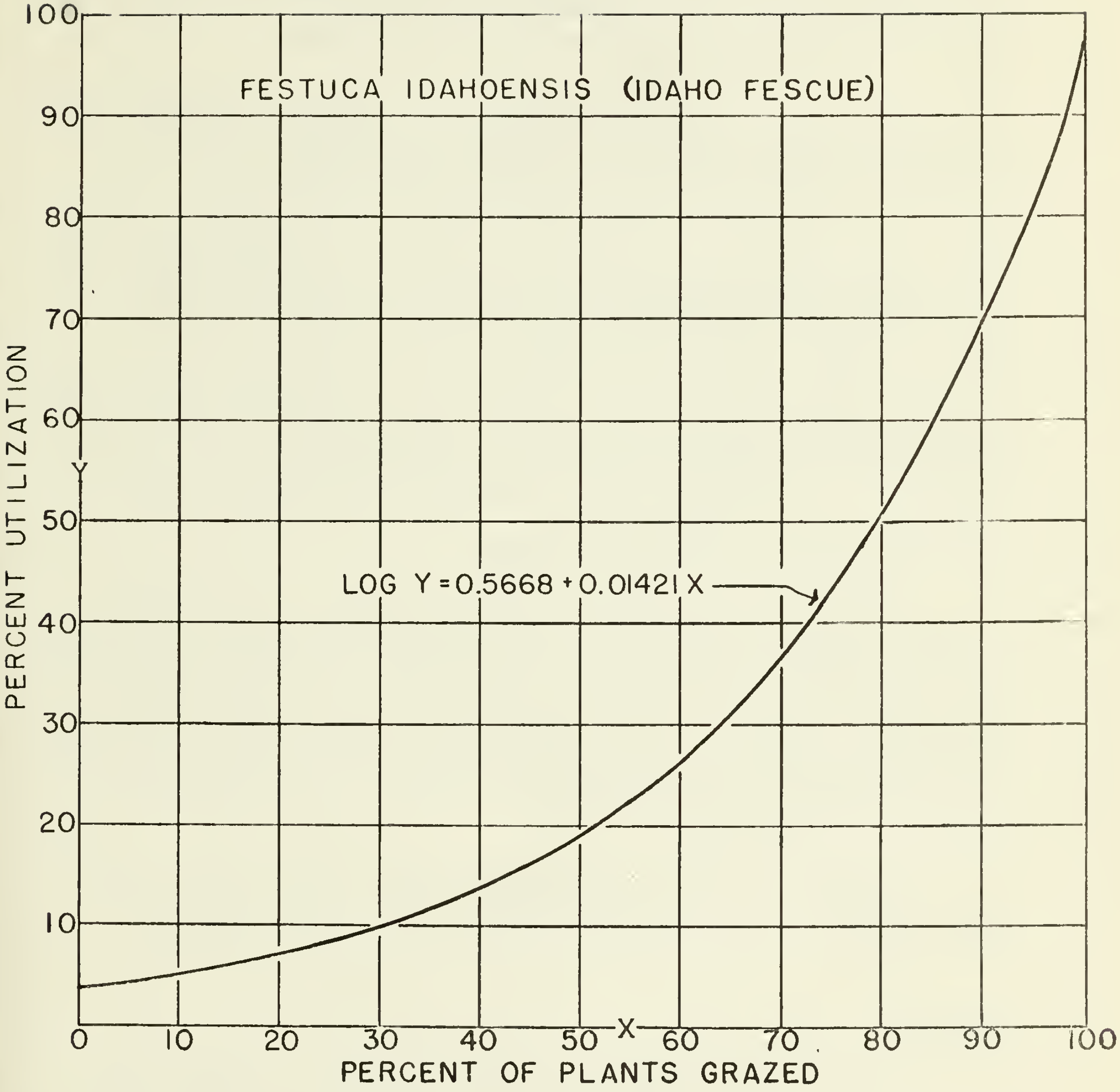

Figure 1.--The relationship between percent of plants grazed and utilization of Idaho fescue (*Festuca idahoensis*) on cattle ranges.

observation is made at every second step on the Idaho fescue plant nearest the right (or left) boot tip. The plant is tallied either as being grazed or not grazed. This procedure is continued until 100 observations are made; the transect length would then be 500 to 600 feet. The percent of plants grazed is automatically determined since 100 observations are used. This percent is then found on figure 1 and extended vertically until the curve is struck. The percent utilization is then read from the corresponding point on the left side of the figure.

The grazing use should be readily apparent on all plants tallied as grazed. If the extreme tips of several leaves were missing, the plant should be classified as ungrazed rather than grazed. After Idaho fescue plants start to dry, the leaves sometimes may be pulled out from the base rather than break near the point where grasped. This tendency appears to be more common for plants growing on granitic soils than for those on sedimentary soils, perhaps because the plants dry earlier and faster on granitic soils. Even though some leaves may pull out from the base, the plant usually has a grazed appearance and grazing can be confirmed if a short stubble can be felt with the fingers. Plants growing beneath shrubs or otherwise inaccessible to cattle should be ignored -- counting neither as grazed or ungrazed. Also, seedlings and plants less than 1/4 inch in basal diameter, even though accessible, should be ignored.

The number of transects used to determine the utilization of Idaho fescue by the percent-of-plants-grazed method on a primary or key cattle range area would be governed by the desired accuracy. The minimum number of transects for a given area has not been determined. However, if the samples were well distributed throughout the primary range area, the time required to gather utilization information would not be burdensome because of the speed and simplicity of the method.

Although the percent-of-plants-grazed method has not been tested in other areas, it would appear to be useful wherever Idaho fescue is the important forage plant on cattle ranges.

## Summary

A method using percent of plants grazed to estimate the utilization of Idaho fescue on cattle ranges is presented. This relationship is based on regression equation, $\text{Log } Y = 0.5668 + 0.01421\ X$ wherein the logarithms of Y (percent utilization) and the natural numbers of X (percent of plants grazed) are used. The equation is presented as a curve for field use. Utilization estimates derived from the equation and those obtained by the ocular-estimate-by-plot method agree closely. Estimating the utilization of Idaho fescue by the percent of plants grazed appears particularly useful on large units of range.

# REFERENCES CITED

(1) Hurd, Richard M., and Kissinger, Neland A. Jr.
1952. Range investigations, Bighorn National Forest, Wyoming. Station Paper No. 10. Rocky Mountain Forest and Range Experiment Station.

(2) Pechanec, Joseph F. and Pickford, G. D.
1937. A comparison of some methods used in determining percentage utilization of range grasses. Jour. Agr. Res. 54(10): 753-766.

(3) Roach, Mack E.
1950. Estimating perennial grass utilization on semi-desert cattle ranges by percentage of ungrazed plants. Jour. Range Mgt. 3(3): 182-185.

(4) Snedecor, G. W.
1946. Statistical methods. Fourth Edition. Iowa State College Press, Ames, Iowa. Pages 103-137; 374-378.

- - - - -